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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,239	01/31/2006	Cheng Hu	N201 0006/TWB	2657

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EXAMINER	
LARKIN, DANIEL SEAN	
ART UNIT	**PAPER NUMBER**
2856	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/528,239	HU ET AL.	
	Examiner	Art Unit	
	Daniel S. Larkin	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 March 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the use of a "prismatic robot as an actuator" in combination all of the remaining limitations of claim 24 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

Page 1, paragraph [0003], line 3: A -- comma -- should be inserted prior to the term "such".

Page 2, paragraph [0008], line 1: A -- comma -- should be inserted after the term "invention".

Page 2, paragraph [0009], line 1: A -- comma -- should be inserted after the term "Preferably".

Page 3, paragraph [0010], line 2: A -- comma -- should be inserted after the term "embodiment".

Page 3, paragraph [0010], line 3: A -- comma -- should be inserted after the term "embodiments". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 1, 10, and 13-16: The preamble of each of these independent claims recites a method for detecting a location of a leak; however, in each independent claim, the body of the claim fails to recite any leak location step. The body of the claim in each

independent claim could literally read on any detection of a chemical spill, detection of a biological agent, or detection of a hydrocarbon gas. The body of each claim is not specific to leak detection as Applicants appear to suggest by the preamble.

Re claims 17, 23, 24, and 26: The preamble of each of these independent claims recites an apparatus for detecting a location of a leak; however, in each independent claim, the body of the claim fails to recite means for locating a leak. The body of the claim in each independent claim could literally read on any detection of a chemical spill, detection of a biological agent, or detection of a hydrocarbon gas. The body of each claim is not specific to leak detection as Applicants appear to suggest by the preamble.

6. The indicated allowability of claims 13, 14, 23, and 24 are withdrawn in view of the newly discovered reference(s) to US 6,701,772 (Kreichauf et al.) and US 5,440,916 (Stone et al.). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by US 5,979,239 (Youngquist et al.).

Youngquist et al. disclose an ultrasonic leak imaging system, comprising: a ultrasonic transducer array (104) for receiving/sensing a plurality of ultrasonic pressure variations due to a leak condition; and a monitor (131) for providing a real-time two-dimensional image of the ultrasonic emission profile in a region of space defined by the field of view of a detector. The time varying intensity of the ultrasound received is in sense related to the concentration, such that the intensity increases with increasing concentration.

9. Claims 1-4, 6, 7, 12, 13, 16-19, 21-23, and 26, are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,701,772 (Kreichauf et al.).

With respect to the limitations of claims 1-3 and 12, Kreichauf et al. disclose a chemical or biological attack detection system and method of operating such a system, comprising: (a) providing a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations simultaneously; (b) measuring the plurality of gas concentrations at the same time while maintaining a position of the sensor array; (c) determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); (d) moving the sensor array to a

new location depending upon the local gas concentration profile determined in step (c) (col. 8, lines 35-37); and, (e) repeating steps (b) to (d) until a stopping condition is achieved. Figure 9 shows an embodiment of a detector (400) that contains decontamination equipment that would create a stopping condition to stop the detector from measuring gas concentrations and moving the sensor array. Additionally, the embodiment of Figure 9 may be used to transport passengers from high concentrations of gas, which would again stop the detector for looking at higher concentrations of gas.

With respect to the limitation of claim 4, the some algorithm is necessary to determine a higher concentration than other concentrations within a given region.

With respect to the limitation of claims 6 and 7, the detector is used to detect harmful chemicals, in which any amount is deemed to be harmful to occupants of a building, such that evacuation of the building is necessary.

With respect to the limitations of claim 13, Kreichauf et al. disclose a chemical or biological attack detection system and method of operating such a system, comprising: (a) providing a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations; (b) measuring the plurality of gas concentrations; (c) determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); (d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c) (col. 8, lines 35-37); and, (e) repeating steps (b) to (d) until a stopping condition is achieved, the method further comprising determining a global gas concentration, as it relates to the building, based on a plurality of the local gas concentration profiles (col. 3, lines 14-

17). Figure 9 shows an embodiment of a detector (400) that contains decontamination equipment that would create a stopping condition to stop the detector from measuring gas concentrations.

With respect to the limitations of claim 16, Kreichauf et al. disclose a chemical or biological attack detection system and method of operating such a system, comprising: (a) providing a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations simultaneously; (b) moving the sensor array within the test region according to a scanning model until the presence of a gas leak/hazardous condition is detected; (c) simultaneously measuring the plurality of gas concentrations at a current location to determine a local gas concentration profile; (d) calculating a direction of higher concentration based on the local gas concentration profile; (e) moving the sensor array in the calculated direction; and, (e) repeating steps (d) and (e) until the sensor is positioned proximate the location of the highest gas concentration within the test region/building.

With respect to the limitations of claims 17 and 26, Kreichauf et al. disclose a chemical or biological attack detection system, comprising: (a) a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations simultaneously; (b) a control system (302) operatively coupled to the sensor array for determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); and, (c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of gas within a test region/building until a stopping condition is achieved. Figure 9 shows an embodiment of

a detector (400) that contains decontamination equipment that would create a stopping condition by stopping the detector from measuring gas concentrations and moving the sensor array since the threat would be eliminated. Additionally, the embodiment of Figure 9 may be used to transport passengers from high concentrations of gas, which would again stop the detector for looking at higher concentrations of gas.

With respect to the limitation of claim 18, the controller further comprises a display screen for plotting the hot spots or high concentration areas of harmful agents.

With respect to the limitation of claim 19, the control system/controller is defined as a computer and operator interface.

With respect to the limitations of claims 21 and 22, Kreichauf et al. disclose that any suitable known detector or any sensor used in chemical analysis may be used. Therefore, the invention contemplates the use of the named sensors. Moreover, calibrated sensor are inherently used.

With respect to the limitations of claim 23, Kreichauf et al. disclose a chemical or biological attack detection system, comprising: (a) a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations; (b) a control system (302) operatively coupled to the sensor array for determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); and, (c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of gas within a test region/building until a stopping condition is achieved, wherein the actuator comprises a sensor positioning system/robot movable in one, two, or three dimensions within a test

region/building. Figure 9 shows an embodiment of a detector (400) that contains decontamination equipment that would create a stopping condition by stopping the detector from measuring gas concentrations and moving the sensor array since the threat would be eliminated. Additionally, the embodiment of Figure 9 may be used to transport passengers from high concentrations of gas, which would again stop the detector for looking at higher concentrations of gas.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,422,061 (Sunshine et al.).

Sunshine et al. disclose a portable vapor sensing device of detecting the presence and concentration of a wide variety of specified vapors, the device comprising: a sensor array (720) 1comprising a plurality of spaced-apart sensors (740) configured to measure a plurality of gas concentrations. Sunshine et al. further disclose that the sensing device can be used for profiling a chemical environment in hazardous materials situation to assist emergency crew to accurately select containment strategies, col. 26, lines 40-44. The examiner argues that one would not have the ability to provide an

accurate containment strategy without knowing the concentration profile of the leak or hazardous environment.

12. Claims 14, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,701,772 (Kreichauf et al.) in view of US 5,279,795 (Hughes et al.).

With respect to the limitations of claim 14, Kreichauf et al. disclose a chemical or biological attack detection system and method of operating such a system, comprising: (a) providing a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations; (b) measuring the plurality of gas concentrations; (c) determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); (d) moving the sensor array to a new location depending upon the local gas concentration profile determined in step (c) (col. 8, lines 35-37); and, (e) repeating steps (b) to (d) until a stopping condition is achieved. Kreichauf et al. disclose measuring harmful chemical or biological agents; but, the reference fails to expressly measure hydrogen. Figure 9 shows an embodiment of a detector (400) that contains decontamination equipment that would create a stopping condition to stop the detector from measuring gas concentrations and moving the sensor array. Additionally, the embodiment of Figure 9 may be used to transport passengers from high concentrations of gas, which would again stop the detector for looking at higher concentrations of gas.

Hughes et al. disclose a chemical sensing apparatus, comprising: an array of two

sensors for sensing chemicals. The reference discloses that sensors are used to measure hydrogen concentration. Modifying the detector of Kreichauf et al. to measure for hydrogen would have been obvious to one of ordinary skill in the art because the buildup of hydrogen can be harmful for individuals due to hydrogen's explosive nature and giving the detector the ability to sense hydrogen would increase the flexibility of the self-propelled detector.

With respect to the limitations of claims 21 and 22, Kreichauf et al. disclose that any suitable known detector or any sensor used in chemical analysis may be used, although the reference fails to expressly disclose semiconductor sensors or MOS capacitors.

Hughes et al. disclose a chemical sensing apparatus, comprising: an array of two sensors for sensing chemicals, specifically hydrogen. The reference further discloses that sensors used are MOS capacitors. Modifying the detector of Kreichauf et al. to utilize semiconductor sensors or MOS capacitors would have been obvious to one of ordinary skill in the art because these types of sensor are well known chemical sensors. Additionally, Kreichauf et al. are concerned with chemical agents and would require specific sensors used in chemical sensing environments. Moreover, the use of calibrated sensors are well within the purview of one of ordinary skill in the art.

13. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,701,772 (Kreichauf et al.) in view of US 5,440,916 (Stone et al.).

With respect to the limitations of claim 24, Kreichauf et al. disclose a chemical or biological attack detection system, comprising: (a) a sensor array (408, col. 7, lines 28-30) comprising a plurality of sensors configured to measure a plurality of gas concentrations; (b) a control system (302) operatively coupled to the sensor array for determining a local gas concentration profile based on the measured gas concentrations (col. 8, lines 35-41); and, (c) an actuator controlled by the control system for moving the sensor array toward the highest concentration of gas within a test region/building until a stopping condition is achieved. Figure 9 shows an embodiment of a detector (400) that contains decontamination equipment that would create a stopping condition by stopping the detector from measuring gas concentrations and moving the sensor array since the threat would be eliminated. Additionally, the embodiment of Figure 9 may be used to transport passengers from high concentrations of gas, which would again stop the detector for looking at higher concentrations of gas. Furthermore, Kreichauf et al. disclose that the actuator comprises a robot. Kreichauf et al. fail to disclose, however, that the robot comprises three degrees of freedom.

Stone et al. disclose an emergency response mobile robot having three degrees of freedom in an arm (18) holding a tube (130) in contact with a sensor array (144). Modifying the detector of Kreichauf et al. with arm movable in three degrees of freedom would have been obvious to one of ordinary skill in the art as a mean of allowing the sensing element to be brought very close to the harmful agent, which in turn allows for very accurate sensing of the environment.

With respect to the limitations of claim 25, Kreichauf et al. disclose a chemical sensing apparatus comprising all of the limitations of base claim 17. Kreichauf et al., however, fail to disclose a comparator for comparing the measured gas concentration to a set point stored in memory.

Stone et al. disclose an emergency response mobile robot, whereby the sensing elements determine the types of combustible substances in the atmosphere, as well as the concentration of each type of substance relative to a pre-determined lower explosive limit. Comparing the concentration of a combustible gas within the atmosphere with a stored preset limit would have been obvious to one of ordinary skill in the art in order to determine if air quality is tolerable or if evacuation procedures are required due to the condition of the atmosphere.

Allowable Subject Matter

14. The following is a statement of reasons for the indication of allowable subject matter:

Prior art was not relied upon to reject claims 5, 8, 9, 11, 15, 20 because the prior art fails to recite this limitations in combination with all of the limitations of the base claim.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Larkin whose telephone number is 571-272-2198. The examiner can normally be reached on 8:00 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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09 November 2007